

REMARKS

In the last Office Action, the Examiner rejected claims 1-3 and 5-9 under 35 U.S.C. § 112, 1st paragraph; rejected claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP 2000-63963 ("JP '963"); rejected claims 1-3 and 5-9 under 35 U.S.C. § 103(a) as being unpatentable over JP '963; rejected claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over WO 00/09772, which corresponds to U.S. Patent No. 6,416,565 to Yazawa et al.; and rejected claims 1-3 and 5-9 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of Yazawa et al.

Applicants wish to thank the Examiner for granting an interview and speaking with Applicants' representative on June 2, 2004. The following remarks are consistent with the topics discussed during the interview. For purposes of this Reply, the ratio of CaO to (SiO₂ + CaO) will be referred to as the "CaO ratio," and the ratio of Fe to (FeO_x + SiO₂ + CaO) will be referred to as the "Fe ratio."

Applicants respectfully traverse the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 112, 1st paragraph. The Examiner has contended that the expressions "greater than 0.6 to 0.85" and "greater than 0.5 to 0.6" in claims 1 and 5 constitute new matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention.

Applicants respectfully submit that neither the phrase "greater than 0.6 to 0.85" nor the phrase "greater than 0.5 to 0.6" constitutes new matter. The specification, as originally filed, describes the CaO ratio as a value "in the range of 0.6 to 0.85." (Spec.,

p. 9, lines 14-16.) Thus, the specification provides written description support for a CaO ratio having a value of 0.6, a value of 0.85, or *any* value between 0.6 and 0.85. As originally filed, claims 1 and 5 recited that the CaO ratio “is 0.6 to 0.85.” Like the description in the specification, this claim element included a CaO ratio having a value of 0.6, a value of 0.85, and any value between 0.6 and 0.85.

Amending the claims to include a CaO ratio having a value “greater than 0.6 to 0.85,” as in the Amendment filed February 11, 2003, does not render this claim element outside the scope of the written description of the specification. As noted above, the specification provides written description support for a CaO ratio having a value of 0.6, a value of 0.85, or *any* value between 0.6 and 0.85. An amendment made only to exclude the value 0.6 from the claims does not change this fact. Presently, claims 1 and 5, which recite a CaO ratio of “greater than 0.6 to 0.85,” include any CaO ratio values between 0.6 up to and including 0.85. Because this range falls within the range of possible CaO ratio values described in the specification (i.e., a value of 0.6, a value of 0.85, or *any* value between 0.6 and 0.85), the presently claimed CaO ratio range necessarily finds proper written description support in the originally filed specification. Similar analysis demonstrates that the presently claimed FeO ratio value of “greater than 0.5 to 0.6” also finds proper written description support in the originally filed specification.

As further evidence that the inventors had possession of the presently claimed invention at the time the application was filed, certain exemplary embodiments disclosed in the specification include a CaO ratio of “greater than 0.6 to 0.85.” For instance, Table 2, which is associated with Example 1, describes a slag having a CaO

ratio of 0.622 (i.e., $16.6/(10.1 + 16.6)$). In view of this example, it would be against reason to conclude that there is no written description support for the presently claimed CaO ratio value of “greater than 0.6 to 0.85.” The value 0.622 clearly represents one example of a CaO ratio value that is greater than 0.6 and less than or equal to 0.85.

For at least the reason that the originally filed specification provides proper written support for the claim elements “greater than 0.6 to 0.85” and “greater than 0.5 to 0.6,” neither of these claim elements constitutes new matter. Accordingly, the Section 112, 1st paragraph rejection of claims 1-3 and 5-9 is improper and should be withdrawn.

Applicants respectfully traverse the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP 2000-63963 (“JP ‘963”). JP ‘963 fails to disclose or suggest every claim element. For example, both independent claim 1 and independent claim 5 recite a combination of method steps including, *inter alia*, producing a slag, in which a CaO ratio is *greater* than 0.6 to 0.85, and an Fe ratio is *greater* than 0.5 to 0.6. JP ‘963 fails to disclose or suggest at least these claim elements.

The Examiner has properly recognized that JP ‘963 does not disclose, e.g., a CaO ratio of greater than 0.6 to 0.85, as claimed in the present application. In an attempt to support the Section 102(a) rejection of claims 1-10, however, the Examiner has asserted that the CaO ratio of JP ‘963 and the claimed CaO ratio “touch” and, therefore, “there is no patentable difference” between the CaO ratio of JP ‘963 and the claimed CaO ratio.

Applicants respectfully submit that the claimed CaO ratio and the CaO ratio disclosed in JP ‘963 do not touch, and therefore, the CaO ratio of JP ‘963 does not

anticipate the claimed CaO ratio. In order to “touch” under *Titanium Metals*, which the Examiner has relied upon, a claimed range and a range disclosed in the prior art must share at least one value (i.e., there must be at least one composition in the prior art that is included in the claimed range). Here, none of the values of the prior art CaO ratio is included in the presently claimed CaO ratio. JP ‘963 discloses a CaO ratio in a range of 0.3 to 0.6. Claims 1 and 5 of the present application, however, recite a CaO ratio that is “greater than 0.6” (i.e., not equal to 0.6). Because not even a single CaO ratio value of JP ‘963 is equal to any CaO ratio value of the present claims, the claimed CaO ratio range and the CaO ratio range of JP ‘963 do not “touch.” Accordingly, JP ‘963 does not anticipate at least the claimed CaO ratio. JP ‘963 also fails to anticipate the claimed Fe ratio.

JP ‘963 also fails to render obvious the claimed CaO ratio and the claimed Fe ratio. For example, despite the closeness between the CaO and Fe ratio values of JP ‘963 and the presently claimed CaO and Fe ratios, the ratios of JP ‘963 have different properties from those offered by the presently claimed ratios. Therefore, one of ordinary skill in the art would not have expected that the ratios of the prior art and those of the present claims would have the same properties.

The specification of the present application specifically identifies JP ‘963 and describes several properties and benefits the CaO and Fe ratio values of the present claims offer over the ratio values of JP ‘963. (Spec., p. 13.) For example, the method of the present invention, including the recited CaO and Fe ratios, results in lower amounts of copper loss to the slag as compared to the methods of JP ‘963. *Id.*

The disclosure of the present application identifies other unexpected results attributed, at least in part, to the CaO and Fe ratios used in the slag. For example, at a temperature of 1280°C, a CaO ratio above 0.6, and an Fe ratio above 0.5, the melting area generated by the methods of the present invention is different than for conventionally known ternary compounds. While the conventional phase diagrams predict a melt area at 1280°C only in areas of concentrated FeO or Fe₂O₃, the inventors have found that the actual production conditions generate unexpected results. Specifically, using the claimed CaO and Fe ratios, along with the presence of copper oxide in the slag, a melt area at temperatures of about 1280°C may be formed even in areas with less FeO_x than conventionally predicted. (Spec., p. 13, lines 16-19.)

Because JP '963 fails to disclose every claim element, and because there is no suggestion in JP '963 that the CaO and Fe ratios of JP '963 would result in properties similarly to those found by the inventors using the presently claimed CaO and Fe ratios, the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP '963 is improper and should be withdrawn.

Applicants respectfully traverse the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 103(a) as being unpatentable over JP '963. No *prima facie* case of obviousness has been established with respect to claims 1-3 and 5-9 for at least the reason that JP '963 fails to teach or suggest every claim element. For example, JP '963 fails to teach or suggest a combination of method steps including, *inter alia*, producing a slag, in which a weight ratio of CaO to (SiO₂ + CaO) ("CaO ratio") is *greater* than 0.6 to

0.85, and a weight ratio of Fe to ($\text{FeO}_x + \text{SiO}_2 + \text{CaO}$) ("Fe ratio") is *greater* than 0.5 to 0.6, as included in independent claims 1 and 5.

The Examiner has properly noted that the claimed CaO and Fe ratios do not overlap with the ratios disclosed in JP '963. The Examiner has suggested, however, that the claimed ratios are unpatentable because the claimed ratios and the ratios of JP '963 are close enough that one skilled in the art would have expected that these ratios would have the same properties. Applicants respectfully disagree. For example, Fig. 1A of JP '963 shows a graph of copper amount in the slag as a function of the CaO ratio (horizontal axis) and Fe% (vertical axis). The lines on the graph represent the saturation lines of each solid phase. As shown, the claimed CaO ratio of greater than 0.6 falls outside of these saturation lines. This fact would indicate to one skilled in the art that at CaO ratios of more than 0.6, there would be significant changes in the amount of copper in the slag and in the slag properties. Accordingly, from the disclosure in JP '963, one skilled in the art would not have expected the claimed CaO and Fe ratios to have the same properties as the ratios of JP '963.

Further, as discussed above, the claimed CaO and Fe ratios generate unexpected results. For example, at a temperature of 1280°C, a CaO ratio above 0.6, and an Fe ratio above 0.5, the melting area is different than for conventionally known ternary compounds. While the conventional phase diagrams predict a melt area at 1280°C only in areas with large amounts of FeO or Fe_2O_3 , the inventors have found that the actual production conditions generate unexpected results. Specifically, a melt area at temperatures of about 1280°C may be formed even in areas with less FeO_x than conventionally predicted. (Spec., p. 13.) Further, the methods of the present invention,

including the recited CaO and Fe ratios, result in lower amounts of copper loss than the methods of JP '963. (Spec. , p. 13.)

For at least these reasons, the Section 103(a) rejection of claims 1-3 and 5-9 as being unpatentable over JP '963 is improper and should be withdrawn.

Applicants respectfully traverse the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over WO 00/09772. JP '963 and WO 00/09772 are related documents (i.e., JP '963 served as the priority document for PCT/JP99/04350, which published as WO 00/09772). Based on a review of the figures and the automated English language translation of JP '963 provided by the Japanese Patent Office, the disclosures of JP '963 and WO 00/09772 appear substantially identical. Therefore, the comments above with respect to JP '963 and the rejection of claims 1-10 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP '963 apply here as well. Accordingly, Applicants respectfully submit that the rejection of claims 1-3 and 5-9 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over WO 00/09772 is improper and should be withdrawn.

Applicants respectfully traverse the rejection of 1-3 and 5-9 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of Yazawa et al. The Examiner has contended that claims 1-3 and 5-9 of the present application are not "patentably distinct" from claims 1-10 of Yazawa et al. because the slag composition of Yazawa et al. does not "patentably differ" from the claimed slag composition. Other than a citation to *Titanium Metals*, the Examiner has

not explained or further offered reasoning in support of this contention. In view of the similarities with respect to the rejections based on JP '963 and WO 00/09772, Applicants will assume that the Examiner intended similar reasoning to apply here.

Applicants respectfully submit that the claims of the present application are patentably distinct from claims 1-10 of Yazawa et al. Yazawa et al. is an equivalent to WO 00/09772 and relies on JP '963 for foreign priority. Therefore, the comments above with respect to WO 00/09772 and JP '963 also apply to Yazawa et al. Specifically, the claims of the present application patentably differ from claims 1-10 of the '565 patent for at least the reasons that: (1) the claimed CaO ratio does *not* touch the CaO ratio as claimed in Yazawa et al.; (2) the methods recited in the pending claims produce several unexpected results over the methods claimed in Yazawa et al. (e.g., a melting area different than for conventionally known ternary compounds, and lower amounts of copper loss); and (3) based on the disclosure of Yazawa et al., one skilled in the art would not have expected the CaO and Fe ratios in the claims of the present application to have the same properties as the ratios claimed in Yazawa et al.

For at least these reasons, the rejection of claims 1-3 and 5-9 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 of Yazawa et al. is improper and should be withdrawn.

In addition to claims 1-3 and 5-9, Applicants respectfully submit that new claim 11 is in condition for allowance. For example, none of the cited prior art documents includes a CaO ration of "0.62 to 0.85," as included in new claim 11. The range of 0.62 to 0.85 is supported, for example, by Examples 1 and 2 disclosed in the specification.

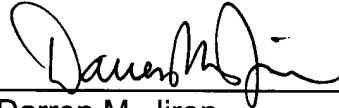
In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

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By: 
Darren M. Jiron
Reg. No. 45,777